

## CLAIMS

Therefore, having thus described the invention, at least the following is claimed:

- 1        1.        A method of determining a capability of at least one communication facility to  
2                pass network layer protocol packets with a particular characteristic between a first  
3                network layer protocol process and a second network layer protocol process, the  
4                method comprising the steps of:  
5                        detecting whether at least one first network layer protocol packet has been  
6                        received, the at least one first network layer protocol packet  
7                        comprising first information with the particular characteristic, the  
8                        first information being capable of causing at least one  
9                        filtering/forwarding entity not to pass the at least one first network  
10                      layer protocol packet; and  
11                      determining the capability of the at least one communication facility to  
12                      pass the network layer protocol packets with the particular  
13                      characteristic.
- 1        2.        The method of claim 1, wherein, upon detecting that the at least one first network  
2                protocol packet has been received, the at least one communication facility is  
3                determined not to comprise the at least one filtering/forwarding entity and is  
4                determined to be capable of passing the network layer protocol packets with the  
5                particular characteristic.
- 1        3.        The method of claim 1, wherein, upon detecting that the at least one first network  
2                protocol packet is no longer expected to be received, the at least one  
3                communication facility is determined to comprise the at least one  
4                filtering/forwarding entity and is determined not to be capable of passing the  
5                network layer protocol packets with the particular characteristic.

- 1        4.        The method of claim 1, further comprising the step of:  
2                    transmitting at least one second network layer protocol packet comprising  
3                    second information with the particular characteristic, the second  
4                    information being capable of causing at least one  
5                    filtering/forwarding entity not to pass the at least one second  
6                    network layer protocol packet.
- 1        5.        The method of claim 1, wherein the particular characteristic comprises a  
2                    destination network layer address that is outside of a network address realm  
3                    comprising network layer addresses of network layer protocol packets that would  
4                    be forwarded by the at least one filtering/forwarding entity.
- 1        6.        The method of claim 5, wherein the at least one filtering/forwarding entity is at  
2                    least one network layer router that operates as a peer protocol layer entity to the at  
3                    least one first network layer protocol process and the at least one second network  
4                    layer protocol process.
- 1        7.        The method of claim 6, wherein the at least one first network layer protocol  
2                    process is an internet protocol (IP) process, wherein the at least one second  
3                    network layer protocol process is an internet protocol (IP) process, and the at least  
4                    one network layer router is at least one internet protocol (IP) router.
- 1        8.        The method of claim 1, wherein the step of detecting whether at least one first  
2                    network layer protocol packet has been received further comprises the step of:  
3                    receiving the at least one first network layer protocol packet.

- 1        9.        The method of claim 1, wherein the step of detecting whether at least one first  
2        network layer protocol packet has been received further comprises the step of:  
3                determining that the at least one first network layer protocol process is not  
4                expected to be received.
- 1        10.        The method of claim 9, wherein the step of determining that the at least one first  
2        network layer protocol process is not expected to be received further comprises  
3        the steps of:  
4                starting a timeout counter associated with transmitting at least one second  
5                network layer protocol packet;  
6                detecting expiration of the timeout counter without having received the at  
7                least one first network layer protocol packet.
- 1        11.        The method of claim 9, wherein the step of determining that the at least one first  
2        network layer protocol process is not expected to be received further comprises  
3        the step of:  
4                receiving a control message indicating that the at least one first network  
5                layer protocol packet was not passed through the at least one  
6                communication facilities.
- 1        12.        The method of claim 11, wherein the control message is an internet control  
2        message protocol (ICMP) message.
- 1        13.        The method of claim 12, wherein the ICMP message is at least one of: a  
2        destination unreachable message, a time exceeded message, a parameter problem  
3        message, a source-quench message, and a redirect message.
- 1        14.        The method of claim 1, wherein the first network protocol layer process is an  
2        internet protocol (IP) layer process.

- 1        15.     The method of claim 1, wherein the second network protocol layer process is an  
2               internet protocol (IP) layer process.
- 1        16.     The method of claim 1, wherein the first network layer process and the second  
2               network layer process are peer protocol layer entities.
- 1        17.     The method of claim 1, wherein determining that the at least one communication  
2               facility passes network layer protocol packets with the particular characteristic  
3               implies that the at least one communication facility does not utilize routing at a  
4               peer protocol layer to the first network layer process and the second network layer  
5               process.
- 1        18.     The method of claim 17, wherein the at least one communication facility provides  
2               services below the first network protocol layer process and the second protocol  
3               layer process that establish a one-to-one association between the first network  
4               protocol layer process and the second network protocol layer process.
- 1        19.     The method of claim 18, wherein the services provided by the network are  
2               connection-oriented services that establish the one-to-one association.
- 1        20.     The method of claim 19, wherein the connection-oriented services are circuit-  
2               switching services.
- 1        21.     The method of claim 19, wherein the connection-oriented services are connection-  
2               oriented packet-switching services.
- 1        22.     The method of claim 21, wherein the connection-oriented packet-switching  
2               services are layer two services.

- 1       23.    The method of claim 21, wherein each of the connection-oriented packet-  
2           switching services are: asynchronous transfer mode (ATM), frame relay, and  
3           X.25.
- 1       24.    The method of claim 18, wherein the one-to-one association is established by a  
2           tunneling protocol that encapsulates the network protocol packets.
- 1       25.    The method of claim 24, wherein the tunneling protocol provides a virtual private  
2           network (VPN).
- 1       26.    The method of claim 24, wherein the tunneling protocol further comprises at least  
2           one: Generic Routing Encapsulation (GRE), Transmission Control Protocol  
3           (TCP), Secure IP (IPsec), Point-to-Point Tunneling Protocol (PPTP), Layer 2  
4           Forwarding Protocol (L2F), Layer 2 Tunneling Protocol (L2TP), and Multi-  
5           Protocol Label Switching (MPLS).
- 1       27.    The method of claim 1, wherein determining that the at least one communication  
2           facility does not pass network layer protocol packets with the particular  
3           characteristic implies that the network utilizes routing at a peer protocol layer to  
4           the first network layer process and the second network layer process.
- 1       28.    The method of claim 27, wherein determining that the network utilizes routing  
2           implies that the network has at least a layer three network core.

1       29.    A system to determine a capability of at least one communication facility to pass  
2            network layer protocol packets with a particular characteristic between a first  
3            network layer protocol process and a second network layer protocol process, the  
4            method comprising the steps of:

5                first logic configured to detect whether at least one first network layer  
6                protocol packet has been received, the at least one first network  
7                layer protocol packet comprising first information with the  
8                particular characteristic, the first information being capable of  
9                causing at least one filtering/forwarding entity to not pass the at  
10              least one first network layer protocol packet; and

11              second logic configured to determine the capability of the at least one  
12              communication facility to pass the network layer protocol packets  
13              with the particular characteristic.

1       30.    The system of claim 29, wherein based at least upon the first logic detecting that  
2            the at least one first network protocol packet has been received, the at least one  
3            communication facility is determined not to comprise the at least one  
4            filtering/forwarding entity and is determined to be capable of passing the network  
5            layer protocol packets with the particular characteristic.

1       31.    The system of claim 29, wherein based at least upon the first logic detecting that  
2            the at least one first network protocol packet is no longer expected to be received,  
3            the at least one communication facility is determined to comprise the at least one  
4            filtering/forwarding entity and is determined to not be capable of passing the  
5            network layer protocol packets with the particular characteristic.

- 1        32.    The system of claim 29, further comprising the step of:  
2                    logic configured to transmit at least one second network layer protocol  
3                    packet comprising second information with the particular  
4                    characteristic, the second information being capable of causing at  
5                    least one filtering/forwarding entity to not pass the at least one  
6                    second network layer protocol packet.
- 1        33.    The system of claim 29, wherein the particular characteristic comprises a  
2                    destination network layer address that is outside of a network address realm  
3                    comprising network layer addresses of network layer protocol packets that would  
4                    be forwarded by the at least one filtering/forwarding entity.
- 1        34.    The system of claim 31, wherein the at least one filtering/forwarding entity is at  
2                    least one network layer router that operates as a peer protocol layer entity to the at  
3                    least one first network layer protocol process and the at least one second network  
4                    layer protocol process.
- 1        35.    The system of claim 32, wherein the at least one first network layer protocol  
2                    process is an internet protocol (IP) process, wherein the at least one second  
3                    network layer protocol process is an internet protocol (IP) process, and the at least  
4                    one network layer router is at least one internet protocol (IP) router.